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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/642,765	08/22/2000	Toshihiko Taguchi	1023/HIROSE	8065

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EXAMINER
COOKE, COLLEEN P

ART UNIT	PAPER NUMBER
1725	11

DATE MAILED: 05/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	09/642,765	TAUGUCHI ET AL.	
	Examiner	Art Unit	
	Colleen P Cooke	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☒ Claim(s) *4 and 5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Arguments

Applicant's arguments filed 2/4/02 have been fully considered but they are not persuasive. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

Applicant is advised that should claim 4 be found allowable, claim 5 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paruchuri et al. (5928404).

With respect to claims 1 and 2, Paruchuri et al. teaches a lead-free solder paste including a 96.5% tin- 3.5% silver alloy powder mixed with 3-10% elemental copper (Column 3, lines 59-65), and also a flux (see Column 3, lines 23-24). Although Paruchuri et al. does not teach using

less than 3% copper as claimed, the prior art range is so close that one skilled in the art would have expected it to have the same properties. *Titanium Metals Corp. v. Banner,* 227 USPQ 773.

With respect to claim 17, Paruchuri et al. teaches that the solder paste is printed onto a board, and electronic component is placed in the paste, and the assembly is heated to a temperature sufficient to cause the powder to melt and flow (Column 3, lines 23-29). Furthermore, Paruchuri et al. teaches that the composite solder paste may be printed and then reflowed (Column 7, lines 60-61).

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paruchuri et al. (5928404), in view of Sakai et al. (6077477).

With respect to claims 1,2, and 13, Paruchuri et al. teaches a lead-free solder paste including a 96.5% tin- 3.5% silver alloy powder mixed with 3-10% elemental copper (Column 3, lines 59-65, and also a flux (see Column 3, lines 23-24). Paruchuri et al. does not teach a solder paste having less than 3% copper. Sakai et al. teaches a lead-free solder alloy having 92-97% Sn, 3-6% Ag and 0.1-2% Cu (Column 2, lines 20-24). This teaching is also emphasized in embodiment 1, shown in Table 1 (Column 3), which has 94.5% Sn, 5% Ag, and 0.5% Cu. Paruchuri et al. and Sakai et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the solder paste of Paruchuri et al. by including an amount of copper less than 3% because as Sakai et al. teaches a solder joint having this small amount of copper has enhanced mechanical properties (Column 2, lines 28-30).

With respect to claims 17 and 18, Paruchuri et al. teaches that the solder paste is printed onto a board, and electronic component is placed in the paste, and the assembly is heated to a temperature sufficient to cause the powder to melt and flow (Column 3, lines 23-29). Furthermore, Paruchuri et al. teaches that the composite solder paste may be printed and then reflowed (Column 7, lines 60-61).

With respect to claims 3-7 and 14-15, Paruchuri et al. teaches that a solder is made by mixing a tin-silver alloy with "an additive powder of tin...silver...copper...or combinations thereof (Column 5, lines 8-12)". Thus, the mixing of a tin-silver alloy with a tin-silver-copper alloy or a tin-copper alloy are envisioned by the teachings of Paruchuri et al. Paruchuri et al. does not teach the specific solder composition of the claim. Sakai et al. teaches a lead-free solder alloy having 92-97% Sn, 3-6% Ag and 0.1-2% Cu (Column 2, lines 20-24). This teaching is also emphasized in embodiment 1, shown in Table 1 (Column 3), which has 94.5% Sn, 5% Ag, and 0.5% Cu. Paruchuri et al. and Sakai et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the solder paste of Paruchuri et al. by including an amount of copper less than 3% because as Sakai et al. teaches a solder joint having this small amount of copper has enhanced mechanical properties (Column 2, lines 28-30). It would have been obvious to modify the solder paste of Paruchuri et al. to the compositional teachings of Sakai et al. because as Sakai et al. teaches a solder joint having this composition has enhanced properties (Column 2, lines 25-30).

With respect to claims 8, 11, 12, and 16, Paruchuri et al. teaches that the solder paste is printed onto a board, and electronic component is placed in the paste, and the assembly is heated to a temperature sufficient to cause the powder to melt and flow (Column 3, lines 23-29).

Furthermore, Paruchuri et al. teaches that the composite solder paste may be printed and then reflowed (Column 7, lines 60-61).

With respect to claims 9-10, the reflow temperature is a property of the solder used. The composition, as taught by Sakai et al., has a melting point of 237-245°C (Column 3, Table 1).

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paruchuri et al. (5928404), in view of Hitch et al. (WO 97/09455).

With respect to claims 1,2, and 13, Paruchuri et al. teaches a lead-free solder paste including a 96.5% tin- 3.5% silver alloy powder mixed with 3-10% elemental copper (Column 3, lines 59-65), and also a flux (see Column 3, lines 23-24). Paruchuri et al. does not teach a solder paste having less than 3% copper. Hitch et al. teaches a lead-free solder alloy having 93.8-96.4% Sn, 3.1-3.5% Ag and 0.5-2.7% Cu (page 2, lines 24-25). This teaching is also emphasized in example alloys 1, 2, and 3 on pages 3-4 which teach compositions of 95.8Sn-3.5Ag-0.67Cu (described as the superior alloy), 94.0Sn-4.5Ag-1.5Cu, and 94.3An-5.0Ag-0.7Cu respectively. Paruchuri et al. and Hitch et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the solder paste of Paruchuri et al. by including an amount of copper less than 3% because as Hitch et al. teaches a solder joint of this composition has superior properties.

With respect to claims 17 and 18, Paruchuri et al. teaches that the solder paste is printed onto a board, and electronic component is placed in the paste, and the assembly is heated to a temperature sufficient to cause the powder to melt and flow (Column 3, lines 23-29).

Furthermore, Paruchuri et al. teaches that the composite solder paste may be printed and then reflowed (Column 7, lines 60-61).

With respect to claims 3-7 and 14-15, Paruchuri et al. teaches that a solder is made by mixing a tin-silver alloy with "an additive powder of tin...silver...copper...or combinations thereof (Column 5, lines 8-12". Thus, the mixing of a tin-silver alloy with a tin-silver-copper alloy or a tin-copper alloy are envisioned by the teachings of Paruchuri et al. Paruchuri et al. does not teach the specific solder composition of the claim. Hitch et al. teaches a lead-free solder alloy having 93.8-96.4% Sn, 3.1-3.5% Ag and 0.5-2.7% Cu (page 2, lines 24-25). This teaching is also emphasized in example alloys 1, 2, and 3 on pages 3-4 which teach compositions of 95.8Sn-3.5Ag-0.67Cu (described as the superior alloy), 94.0Sn-4.5Ag-1.5Cu, and 94.3An-5.0Ag-0.7Cu respectively. Paruchuri et al. and Hitch et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the solder paste of Paruchuri et al. to the composition of Hitch et al. because as Hitch et al. teaches a solder joint of this composition has superior properties.

With respect to claims 8, 11, 12, and 16, Paruchuri et al. teaches that the solder paste is printed onto a board, and electronic component is placed in the paste, and the assembly is heated to a temperature sufficient to cause the powder to melt and flow (Column 3, lines 23-29). Furthermore, Paruchuri et al. teaches that the composite solder paste may be printed and then reflowed (Column 7, lines 60-61).

With respect to claims 9-10, the reflow temperature is a property of the solder used. The compositions, as taught by Hitch et al., has a melting point of 213-218°C, 214-21°C, and 214-216°C respectively for alloys 1, 2, and 3 (pages 3-4).

Claims 3-12, 14-16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazem-Goudarzi et al. (5540379), in view of Seelig et al. (5352407), and further in view of Sakai et al. (6077477).

With respect to claims 3-7 and 14-15, Kazem-Goudarzi et al. teaches a solder paste made from two different tin alloy powders, which in a preferred embodiment are a Sn-Pb-Ag alloy powder and a Sn-Pb-Bi alloy powder (Columns 3-4, lines 65-7). Kazem-Goudarzi et al. goes on to teach "alloys of elements such as tin...copper...silver may also be used" (Column 4, lines 27-29). Kazem-Goudarzi et al. does not specifically teach the Sn-Ag-Cu compositions claimed. Seelig et al. teaches removing lead and bismuth from solder alloys as lead is toxic (Column 1, lines 29-34) and generates hazardous waste, while bismuth is mined from lead ore and is not abundantly available (Column 1, lines 48-59). Seelig et al. goes on to teach that such a lead-free, bismuth-free solder would include tin, silver, and copper (Column 2). Seelig et al. does not, however, teach specifically the Sn-Ag-Cu compositions claimed. Sakai et al. teaches a lead-free solder alloy having 92-97% Sn, 3-6% Ag and 0.1-2% Cu (Column 2, lines 20-24). This teaching is also emphasized in embodiment 1, shown in Table 1 (Column 3), which has 94.5% Sn, 5% Ag, and 0.5% Cu.

Kazem-Goudarzi et al., Seelig et al., and Sakai et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the dual alloy paste of Kazem-Goudarzi et al. by using alloys of tin with copper and/or silver to arrive at a final composition such as that taught by Sakai et al. because Seelig et al. teaches

removing the lead and bismuth and using Sn-Ag-Cu instead, while Sakai et al. teaches that the specific Sn-Ag-Cu compositions exhibit superior properties.

With respect to claims 8, 11, 12, 16, and 18, Kazem-Goudarzi et al. teaches that the dual alloy solder paste is printed onto a PCB and reflowed (Column 4, lines 34-47). Although Kazem-Goudarzi et al. does not specifically refer to reflow soldering a surface mounted device or a chip component, the processing of the paste as described is known to be used for exactly that purpose.

With respect to claims 9-10, the reflow temperature is a property of the solder used. The composition, as taught by Sakai et al., has a melting point of 237-245°C (Column 3, Table 1).

Claims 3-12, 14-16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazem-Goudarzi et al. (5540379), in view of Seelig et al. (5352407), and further in view of Hitch et al. (WO 97/09455).

With respect to claims 3-7 and 14-15, Kazem-Goudarzi et al. teaches a solder paste made from two different tin alloy powders, which in a preferred embodiment are a Sn-Pb-Ag alloy powder and a Sn-Pb-Bi alloy powder (Columns 3-4, lines 65-7). Kazem-Goudarzi et al. goes on to teach "alloys of elements such as tin...copper...silver may also be used" (Column 4, lines 27-29). Kazem-Goudarzi et al. does not specifically teach the Sn-Ag-Cu compositions claimed. Seelig et al. teaches removing lead and bismuth from solder alloys as lead is toxic (Column 1, lines 29-34) and generates hazardous waste, while bismuth is mined from lead ore and is not abundantly available (Column 1, lines 48-59). Seelig et al. goes on to teach that such a lead-free, bismuth-free solder would include tin, silver, and copper (Column 2). Seelig et al. does not, however, teach specifically the Sn-Ag-Cu compositions claimed. Hitch et al. teaches a lead-free

solder alloy having 93.8-96.4% Sn, 3.1-3.5% Ag and 0.5-2.7% Cu (page 2, lines 24-25). This teaching is also emphasized in example alloys 1, 2, and 3 on pages 3-4 which teach compositions of 95.8Sn-3.5Ag-0.67Cu (described as the superior alloy), 94.0Sn-4.5Ag-1.5Cu, and 94.3An-5.0Ag-0.7Cu respectively.

Kazem-Goudarzi et al., Seelig et al., and Hitch et al. are analogous art because they are from the same field of endeavor, which is soldering. It would have been obvious to modify the dual alloy paste of Kazem-Goudarzi et al. by using alloys of tin with copper and/or silver to arrive at a final composition such as that taught by Hitch et al. because Seelig et al. teaches removing the lead and bismuth and using Sn-Ag-Cu instead, while Hitch et al. teaches that the specific Sn-Ag-Cu compositions exhibit superior properties.

With respect to claims 8, 11, 12, 16, and 18, Kazem-Goudarzi et al. teaches that the dual alloy solder paste is printed onto a PCB and reflowed (Column 4, lines 34-47). Although Kazem-Goudarzi et al. does not specifically refer to reflow soldering a surface mounted device or a chip component, the processing of the paste as described is known to be used for exactly that purpose.

With respect to claims 9-10, the reflow temperature is a property of the solder used. The compositions, as taught by Hitch et al., has a melting point of 213-218°C, 214-21°C, and 214-216°C respectively for alloys 1, 2, and 3 (pages 3-4).

Conclusion

Any inquiry concerning this or earlier communications from the examiner should be directed to Colleen Cooke, whose telephone number is 703-305-1136. She can normally be reached Monday-Thursday from 7:15-5:45pm.

If attempts to reach the examiner by telephone are unsuccessful, her supervisor, Thomas Dunn, can be reached at 703-308-3318. The official fax number for the organization where this application or proceeding is assigned is 703-305-6078. The unofficial fax number for this examiner is 703-746-3048.

Any inquiry of a general nature relating to the status of this application or proceeding should be directed to the receptionist, whose telephone number is 703-308-0661.

CPC 4/30/2002

M. ALEXANDRA ELVE
PRIMARY EXAMINER